

Application No. 10/565,106  
 Amendment dated April 28, 2009  
 Reply to Office Action of February 26, 2009

Docket No.: 3449-0588PUS1

### AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A lip synchronization test method for a DTV (digital TV) receivers, the method comprising the steps of:

generating [[a]] digital audio and video streams to be used in a test on a DTV receiver, the audio stream having a frame index inserted therein and a video stream having a  
Transient Effect Area Test Signal (TATS) inserted therein;

discriminating an audio frame number and a video field number based upon time indexes of time-indexed audio and video signals;

calculating an audio frame time  $t_a$  and a video field time  $t_v$  from the audio frame number and the video field number; and

measuring a time difference  $d_t$  between the audio and video signals in the DTV receiver using the audio frame time  $t_a$  and the video field time  $t_v$ .

2. (Previously Presented) The lip synchronization test method according to claim 1, wherein an  $n^{\text{th}}$  audio frame time  $t_a$  measured from a time-indexed audio frame waveform is calculated  $t_a = \text{one audio frame time} \times n$  [sec].

3. (Previously Presented) The lip synchronization test method according to claim 1, wherein an  $m^{\text{th}}$  video field time  $t_v$  measured from a time-indexed video frame waveform is calculated  $t_v = m/\text{field rate (field/sec)}$  [sec].

4. (Original) The lip synchronization test method according to claim 1, wherein the audio frame index and the video field index are looped back at a predetermined time period.

5. (Original) The lip synchronization test method according to claim 1, wherein the audio and video time difference  $d_t$  is expressed as

$$d_t = t_a - t_v - t_{\text{dov}} - t_{\text{DTSoffset}},$$

wherein  $t_a$  is an  $n^{\text{th}}$  audio frame time,  $t_v$  is an  $m^{\text{th}}$  video field time corresponding to the

$n^{\text{th}}$  audio frame time,  $t_{\text{dev}}$  is an audio and video time difference measured with a measuring device and  $t_{\text{DTSoffset}}$  is a Decoding Time Stamp (DTS) initial value.

6. (Original) The lip synchronization test method according to claim 1, wherein the audio frame index is formed by inserting a predetermined number of waveforms into the digital audio stream at a predetermined time corresponding to each audio frame.

7. (Previously Presented) The lip synchronization test method according to claim 1, wherein the Transient Effect Area Test Signal (TATS) of the video signal is formed by inserting a 4-level field index into the digital video stream based upon a line corresponding to a Transparent Effect Area (TA) of each video frame.

8. (Currently Amended) A lip synchronization test method of Digital TV (DTV) receivers, the method comprising the steps of:

generating digital audio and video streams to be used in a test on a DTV receiver, the audio and video streams each having a time index inserted therein;

discriminating an audio frame number and a video field number based upon the time indexes of the time-indexed audio and video signals;

calculating an audio frame time  $t_a$  and a video field time  $t_v$  from the audio frame number and the video field number; and

measuring a time difference  $d_t$  between the audio and video signals in the DTV receiver using the audio frame time  $t_a$  and the video field time  $t_v$ .

9. (Original) The lip synchronization test method according to claim 8, wherein the audio and video time difference  $d_t$  is expressed as

$$d_t = t_a - t_v - t_{\text{dev}} - t_{\text{DTSoffset}},$$

wherein  $t_a$  is an  $n^{\text{th}}$  audio frame time,  $t_v$  is an  $m^{\text{th}}$  video field time corresponding to the  $n^{\text{th}}$  audio frame time,  $t_{\text{dev}}$  is an audio and video time difference measured with a measuring

device and  $t_{DTSoffset}$  is a Decoding Time Stamp (DTS) initial value.

10. (Original) The lip synchronization test method according to claim 8, wherein the time index is inserted into a Transient Effect Area (TA).

11. (Original) The lip synchronization test method according to claim 8, wherein the time index of the video signal indexes a video field number.

12. (Original) The lip synchronization test method according to claim 8, wherein the time index of the audio signal indexes an audio frame number.

13. (Original) The lip synchronization test method according to claim 12, wherein the time-indexed signal of the audio signal includes time information and signal number.

14. (Original) A lip synchronization test system for Digital TV (DTV) receivers comprising:

means for detecting a time index signal contained in an audio signal to discriminate a corresponding audio frame number, and calculating a corresponding audio frame time  $t_a$  from the audio frame number;

means for detecting a time index signal contained in the video signal to discriminate a corresponding video field number and calculating a corresponding video field time  $t_v$  from the video field number;

means for measuring a time difference between the audio and video signals; and

means for calculating a lip synchronization time  $d_l$  based upon the time difference between the audio and video signals, the corresponding audio frame time and the video field time.

15. (Original) The lip synchronization test system according to claim 14, wherein the audio time calculating means include:

audio time index detecting means for detecting a time index signal contained in the audio signal;

audio frame number discriminating means for decoding the detected audio time index signal to discriminate the corresponding audio frame number; and

calculating means for calculating the discriminated audio frame number with an audio one frame time to calculate the corresponding audio frame time  $t_a$ .

16. (Original) The lip synchronization test system according to claim 14, wherein the video time calculating means include:

a video time index detecting means for detecting a time index signal contained in the video signal;

a video field number discriminating means for decoding the detected video time index signal to discriminate the corresponding video field number; and

a calculating means for calculating the discriminated video field number with a video field rate to obtain the corresponding video frame time  $t_v$ .

17. (Original) The lip synchronization test system according to claim 14, wherein the lip synchronization time calculating means calculates the audio and video time difference  $d_t$ , expressed as

$$d_t = t_a - t_v - t_{dev} - t_{DTSoffset},$$

wherein  $t_a$  is an  $n^{\text{th}}$  audio frame time,  $t_v$  is an  $m^{\text{th}}$  video field time corresponding to the  $n^{\text{th}}$  audio frame time,  $t_{dev}$  is an audio and video time difference measured with a measuring device and  $t_{DTSoffset}$  is a Decoding Time Stamp (DTS) initial value.